ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	
Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use	IB Docket No. 98-172 RM-9005 RM-9118

COMMENTS OF LOCKHEED MARTIN CORPORATION

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EXECUTIVE SUMMARY

Lockheed Martin Corporation ("Lockheed Martin") hereby submits its comments in the above-captioned rulemaking proceeding. Lockheed Martin is the licensee of the Astrolink™ System, a global geostationary satellite orbit ("GSO") fixed-satellite service ("FSS") Ka-band satellite network and has other pending applications that will be affected by this proceeding. Lockheed Martin believes that, above all, swift resolution of the spectrum allocation and blanket licensing issues under consideration is essential to the rapid development and deployment of current U.S.-licensed Ka-band FSS systems, and requests the Commission to afford this rulemaking proceeding expedited treatment.

Lockheed Martin believes that it may not be technically or commercially possible for ubiquitously deployed FSS and terrestrial fixed service ("FS") systems to successfully share the same spectrum, and supports band segmentation to provide a sole primary designation to either FSS (GSO or non-geostationary satellite orbit ("NGSO")) or FS systems in certain portions of the 17.7-19.7 GHz band. The Commission should extend its band segmentation approach to provide GSO FSS systems with a sole primary designation in the 1000 megahertz of spectrum necessary for full deployment and operation of these systems.

In addition, Lockheed Martin strongly supports the Commission's proposal to implement blanket licensing in certain bands for FSS earth terminals and, to facilitate the rapid implementation of licensed Ka-band GSO FSS systems, asks the Commission to adopt immediately a blanket licensing regime in bands which already have been designated for GSO FSS use on a sole primary basis. Such blanket licensing procedures should be extended to other

GSO FSS bands when the spectrum allocations at issue in this proceeding have been resolved. To the extent technical issues regarding GSO FSS blanket licensing remain, the existing GSO Ka-band Blanket Licensing Working Group ("BL-WG") should continue to discuss and resolve these issues. With respect to NGSO FSS systems, Lockheed Martin, as an NGSO FSS proponent, believes that an industry advisory group should be convened to develop blanket licensing criteria for NGSO FSS earth terminals.

Finally, Lockheed Martin supports the Commission's proposal to adopt a domestic broadcast-satellite service ("BSS") allocation in the 17.3-17.8 GHz band and a corresponding BSS feeder link allocation in the 24.75-25.25 GHz bands. This allocation will not only provide additional spectrum for traditional BSS video services, but will also promote the development of next-generation BSS services to meet the increasing demand for advanced broadband communications services.

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Lockheed Martin Corporation ("Lockheed Martin") hereby submits its comments in the above-captioned rulemaking proceeding. Lockheed Martin is the licensee of the Astrolink™ System, a global geostationary satellite orbit ("GSO") fixed-satellite service ("FSS") Ka-band satellite network. Lockheed Martin also has pending before the Commission applications for (i) certain modifications to the Astrolink™ authorization; (ii) a second-round GSO FSS Ka-band satellite system (Astrolink-Phase II™) ; and (iii) a non-geostationary satellite orbit ("NGSO") FSS satellite system that will operate in Ka-band and V-band frequencies (the LM-MEO System).

Lockheed Martin generally supports the Commission's proposals to segment the 18 GHz band and implement blanket licensing procedures to facilitate the ubiquitous deployment of Ka-band FSS earth terminals, as well as its proposal to allocate the 17.3-17.8 GHz band for BSS services. Lockheed Martin believes, however, that the Commission should adopt a band

segmentation plan and blanket licensing procedures which will permit the ubiquitous deployment of small-antenna user terminals in all available Ka-band downlink spectrum designated for use by GSO FSS and NGSO FSS systems.

I. GHZ SPECTRUM ALLOCATION ISSUES

A. GSO FSS Spectrum Proposals.

1. The Commission Should Designate 500 Megahertz of Spectrum at 18.3-18.8 GHz for GSO FSS Use on a Sole Primary Basis.

The Commission has determined that GSO FSS systems require a minimum of 1000 megahertz of spectrum in each direction of transmission and, in addition to 500 megahertz of downlink spectrum at 19.7-20.2 GHz, allocated 1100 megahertz of downlink spectrum in the 17.7-18.8 GHz band to GSO FSS on a primary basis to ensure that sufficient downlink spectrum would be available.[1] The Commission has since concluded that it is impractical for FSS systems with ubiquitous user terminals to operate co-frequency with FS systems, and that the public interest is best served by segmenting the 18 GHz band.[2] The proposed band segmentation plan, however, does not propose a sole primary GSO FSS designation in the additional 500 megahertz of spectrum necessary to permit the full operation of Ka-band GSO FSS systems. Instead, the

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[1] According to the Commission, the extra 600 megahertz of spectrum was allocated to GSO FSS "in recognition that added flexibility was needed resulting from the requirement to share and coordinate with terrestrial fixed services in the 17.7-18.8 GHz band." *See Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005, 19029-30, 19036-37 (1996) ("*28 GHz First Report and Order*").

[2] *See* NPRM ¶ 19.

Commission proposes to designate only 250 megahertz of unshared downlink spectrum for GSO FSS use at 18.3-18.55 GHz.[3]

The Commission cited two factors supporting its proposal to provide only 250 megahertz of sole primary spectrum to GSO FSS systems, and to designate the 18.55-18.8 GHz band for GSO FSS and FS use on a co-primary basis. The Commission noted that Lockheed Martin plans to operate Astrolink™ gateway earth stations with larger antennas in spectrum shared with terrestrial FS systems, and that the strict p.f.d. limit applicable to FSS operations in the 18.6-18.8 GHz band to protect the Earth exploration satellite-service ("EESS") (passive) and space research ("SR ") (passive) services may require the use of satellite earth stations with higher gain antennas, which are more amenable to sharing with the FS on a co-primary basis.[4] However, the factors cited by the Commission no longer support its preliminary conclusions.

For example, as noted in the Astrolink™ modification application and in the Astrolink-Phase II™ System application, Lockheed Martin now seeks to ubiquitously deploy small user terminals in the full 1000 megahertz of spectrum available for GSO FSS use in the Ka-band.[5] In addition, the strict p.f.d. limit applicable to FSS operations in the 18.6-18.8 GHz

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[3] The 18.55-18.8 GHz band would retain a co-primary designation for GSO FSS and FS use. This co-primary designation for GSO FSS and FS in the 18.55-18.8 GHz band effectively precludes the deployment of small-antenna user terminals in that band.

[4] NPRM ¶ 32.

[5] *See Lockheed Martin Corporation Application for Authority to Modify its Authorization for a Global Ka-band Satellite Communications System in Geostationary Orbit*, File No. 35-SAT-MP/ML-98, 2, 9 (filed Dec. 22, 1997); *Lockheed Martin Corporation Application for Authority to Launch and Operate a Global Ka-band Satellite Communications System in Geostationary Orbit*, File Nos. 39 through 43-SAT-P/LA-98, 37 (filed Dec. 22, 1998).

band is under review within the United States and the ITU, and Lockheed Martin understands that it may become less stringent pursuant to an agreement reached among GSO FSS operators, the EESS community and the U.S. government.[6]

Moreover, the Commission has proposed to downgrade the FS designation in the 18.8-19.3 GHz band to facilitate the ubiquitous deployment of NGSO FSS user terminals. Because the channel pairings for FS systems using the 18.92-19.16 GHz band are located at 18.58-18.82 GHz, the Commission should similarly downgrade the FS designation in the 18.55-18.8 GHz band.[7] This redesignation would permit GSO FSS systems to operate ubiquitous small-antenna user terminals in a full 1000 megahertz of downlink spectrum, and establish parallel designations for the FS channel pairings in these bands.

In view of these circumstances, Lockheed Martin believes that the Commission should revisit its proposal to retain the co-primary designation for GSO FSS and FS services in the 18.55-18.8 GHz band. Instead, the Commission should designate the 18.55-18.8 GHz band for GSO FSS use on a sole primary basis to ensure that Ka-band GSO FSS licensees have access to sufficient spectrum to permit full implementation and operation of their systems.

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[6] *See* ITU-R Document WP-4A/29, *Proposed Recommendation to Change the Power Flux Density Limits in the 18.6 GHz -18.8 GHz Band*, (1998). Relaxation of this limit would allow the use of ubiquitous earth terminals with antennas as small as 65 cm in diameter in this band.

[7] Of course, the Commission could grandfather FS operations in this band which were licensed or had applications on file as of the NPRM release date, as it has proposed for the 18.3-18.55 GHz and 18.8-19.3 GHz bands.

2. If the FCC Does Not Designate the 18.3-18.8 GHz Band for GSO FSS Use on a Sole Primary Basis, Then It Should Designate a Minimum of 250 Megahertz of Spectrum Within This Band for Sole Primary GSO FSS Use.

If the Commission concludes that it cannot redesignate 500 megahertz of spectrum for exclusive GSO FSS use (for a total of 1000 megahertz of sole primary GSO FSS spectrum) as requested above, the Commission should, at a minimum, redesignate 250 megahertz of spectrum in the 18.3-18.8 GHz band to GSO FSS on a sole primary basis. Thus, Lockheed Martin could support the Commission's proposal to redesignate the 18.3-18.55 GHz band for sole primary GSO FSS use. Alternatively, for the reasons described above in connection with the redesignation of 500 megahertz of spectrum for GSO FSS use, Lockheed Martin could support the redesignation of the 18.55-18.8 GHz band for sole primary GSO FSS use, but only if such a redesignation were accompanied by a relaxation of the p.f.d. limit applicable in the 18.6-18.8 GHz band which would permit the successful deployment of ubiquitous small-antenna user terminals.

Redesignation of 250 megahertz of shared GSO FSS/FS spectrum for GSO FSS use will provide GSO FSS systems with 750 megahertz of sole primary spectrum. GSO FSS systems will be able to deploy ubiquitous small-antenna user terminals throughout this spectrum, enabling them to better meet expected demand for advanced broadband satellite communications services.[8] Accordingly, Lockheed Martin supports the redesignation of a minimum of 250

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[8] The Commission proposes to retain a co-primary GSO FSS/FS designation in the 18.55-18.8 GHz band, thereby effectively limiting use of this band to larger GSO FSS "gateway" earth stations.

megahertz of spectrum for sole primary GSO FSS use in the event that it cannot redesignate the 500 megahertz of spectrum needed for full deployment and operation of GSO FSS systems.

The alternative band plans under consideration by the Commission would not provide sufficient spectrum for GSO FSS use. The first alternative plan would redesignate only 150 megahertz of spectrum at 18.4-18.55 GHz for GSO FSS use on a sole primary basis; the 18.3-18.4 GHz band would retain a co-primary GSO FSS/FS designation. FS use of the 18.3-18.4 GHz band not only would preclude the deployment of GSO FSS small antenna user terminals in this band, but also could effectively preclude GSO FSS use of the larger band 18.3-18.425 GHz, or in some cases the entire 18.3-18.55 GHz band. The reason for this is that many Ka-band GSO FSS systems will use wideband TDM downlinks with a bandwidth of at least 125 megahertz or in some cases 250 megahertz. These wideband downlinks would receive harmful interference from co-frequency FS operations in the 18.3-18.4 GHz band, thereby precluding GSO FSS use.

The second alternative band plan would retain the co-primary GSO FSS and FS designations in the 17.7-18.8 GHz band. Retaining this co-primary designation would hinder the deployment of both GSO FSS and FS systems in the 17.7-18.8 GHz bands. As the Commission recognized, separating GSO FSS and FS operations would eliminate the need for new FS operations to coordinate with satellite earth stations and avoid the risk of being precluded from large areas by the introduction of a new satellite earth station.[9] Separation also benefits GSO FSS systems by avoiding the need to individually coordinate earth stations with FS operations

[9] NPRM ¶ 20.

and permitting the use of blanket licensing procedures.[10] Accordingly, this alternative would not further the interests of either GSO FSS or FS operators.

The third alternative plan would require the entire 17.7-19.7 GHz band to be shared between FSS and FS operators on a co-primary basis. Not only would this preclude ubiquitous deployment of GSO FSS user terminals in the 17.7-18.8 GHz band, but it also virtually would preclude NGSO FSS use of the 18.8-19.3 GHz band. Accordingly, this alternative would unacceptably constrain the ability of all Ka-band FSS systems to provide broadband satellite communications services to consumers.

Indeed, any modified band plan which involves significant FSS/FS sharing would inappropriately favor FS applicants at the expense of FSS licensees. Because the capital commitments and deployment timeframes for Ka-band satellite systems are orders of magnitude greater than for FS links, FS operators will be able to apply for and build out their systems for a few years before Ka-band satellite systems are deployed. The continuing deployment of FS systems not only will dramatically alter the sharing environment in co-primary FSS/FS spectrum, it also undermines any conclusion that may be made today about the ability of FSS licensees and FS operators to share down the road.

B. NGSO FSS Should be Provided a Sole Primary Designation in the 18.8-19.3 GHz Band.

Lockheed Martin supports the Commission's proposal to provide NGSO FSS a sole primary designation in the 18.8-19.3 GHz band to allow for ubiquitous deployment of NGSO FSS user terminals. As the Commission recognizes, it will not be possible to deploy ubiquitous

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[10] *Id.* ¶ 21.

small-antenna user terminals in bands shared with the FS on a co-primary basis. Because there is no alternative downlink spectrum for Ka-band NGSO FSS systems, the Commission should redesignate the 18.8-19.3 GHz band for sole primary NGSO FSS use.

C. Other 18 GHz Band Segmentation Issues.

1. The Commission Should Allow Secondary FSS Use of Primary FS Spectrum, But Should Eliminate the Secondary FS Designation in Primary FSS Bands.

Lockheed Martin believes that the Commission should continue to allow secondary FSS use of the 18 GHz band.[11] For example, it may be possible for GSO FSS "gateway" downlinks in some special situations to operate on a secondary basis in bands shared with the FS. Of course, all such secondary operations would be on an unprotected, non-interference basis *vis-à-vis* primary FS operations. However, Lockheed Martin does not support the secondary FS use of spectrum designated for FSS use on a sole primary basis.

The reason for permitting secondary FSS operations in primary FS spectrum, but not secondary FS operations in primary FSS bands, is straightforward: FSS earth stations only *receive* in the 18 GHz band, whereas FS stations also *transmit* at 18 GHz. In other words, secondary FSS operations cannot cause interference to primary FS systems because they do not transmit in the 18 GHz band. Instead, secondary FSS earth stations can only receive (and must accept) interference from FS operations in that band. On the other hand, secondary FS stations

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[11] Secondary use of the 18 GHz band by GSO FSS downlinks requires that the satellite transmitted signal does not interfere with FS receivers, and the GSO FSS earth station can tolerate interference from the FS transmitter. P.f.d. limits applicable to FSS downlink operations in these bands will adequately protect FS receivers from interference.

transmitting in the 18 GHz band can cause significant interference to FSS receive earth stations operating in that band.

As a result of this potential for interference, secondary FS operation in primary FSS spectrum substantially undermines the primary benefit of a sole primary allocation: to avoid interference from the secondary service and the cost and delay associated with interservice coordination. The coordination scheme proposed by the Commission -- which involves burdensome requirements on FSS licensees to report the specific location of millions of user terminals, combined with time-consuming procedures to resolve interference from "secondary" FS stations only after it has occurred -- cannot rectify the substantial disruption that secondary FS operations will cause to primary FSS systems. Accordingly, Lockheed Martin urges the Commission not to permit secondary FS operations in primary FSS spectrum.

2. U.S. GSO FSS Systems Should Be Afforded Coordination Priority Over U.S. NGSO FSS Systems in the 17.7-18.3 GHz Band.

In its Ka-band service rules, the Commission provided U.S. GSO FSS systems with coordination priority over U.S. NGSO FSS systems in 850 megahertz of uplink spectrum in the 27.5-28.35 GHz band.[12] NGSO FSS is to operate on a non-interference basis with respect to the local multipoint distribution service ("LMDS") and GSO FSS systems which have licensing priority in that band.[13] To ensure that GSO FSS operators are able to effectively utilize this

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[12] *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Procedures for Local Multipoint Distribution Service and for Fixed Satellite Services*, Third Report and Order, 12 FCC Rcd 22310, 22338 (1997) ("*28 GHz Third Report and Order*").

[13] *Id.*

spectrum, the Commission should confirm that GSO FSS operations will be afforded coordination priority over NGSO FSS operations in the downlink portion of the band as well. Under the current designation, GSO FSS is afforded co-primary status in the 17.7-18.8 GHz band. To the extent the GSO FSS designation is changed to secondary status in any portion of this downlink band, the Commission should afford GSO FSS operators coordination priority over NGSO FSS systems, in conformance with the coordination priority afforded GSO FSS operators in the 27.5-28.35 GHz uplink band.

3. Grandfathering of FS Operations.

The Commission proposed to grandfather FS operations in proposed sole primary FSS bands that either were licensed or for which applications were filed by the NPRM release date, September 18, 1998.[14] While Lockheed Martin agrees that grandfathering for some period of time may be appropriate for licensed and constructed FS systems, there is no basis on which to provide this benefit to operators who merely have filed an application or who have not yet expended any significant sums of money on constructing their systems, nor is there any basis for grandfathering existing terrestrial FS operations for an indefinite period.

a. Only Systems That Have Been Licensed and Constructed as of the Release Date of the Notice of Proposed Rulemaking Should be Grandfathered.

Consistent with past precedent, the Commission should grandfather only licensed facilities and should dismiss pending applications that would conflict with the band segmentation

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[14] NPRM ¶ 40.

plan.[15] In the *28 GHz Second Report and Order*, the Commission declined to grandfather and dismissed pending applications for services in the 31 GHz band to promote local multipoint distribution service ("LMDS"), which was the service newly designated to use this spectrum in the Commission's band segmentation plan.[16] Specifically, the Commission stated:

> We have carefully considered the advantages and disadvantages of allowing applications for new and expanded 31 GHz services under the existing rules, but conclude that any further growth and development of these services is inconsistent with the band-sharing plan we adopt. . . . Expansion of 31 GHz services would likely have a chilling effect on the efforts of LMDS providers to establish and expand their services in response to consumer demand, seriously jeopardizing our objectives in designating the band for LMDS. . . .Given these considerations, we conclude that it is in the public interest, and in the interest of all of the parties, to dismiss any pending applications.[17]

Similarly, FS operators should not be permitted to deploy *additional* systems in conflict with the Commission's band plan, which would seriously jeopardize the ability of FSS licensees to utilize

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[15] *See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, First Report and Order and Third Notice of Proposed Rulemaking, 7 FCC Rcd 6886 (1992) (only FS facilities *licensed* as of the date the NPRM was adopted would retain primary status); *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, Report and Order, 10 FCC Rcd 4695 (1995) ("*AVM Order*") (grandfathering provisions apply only to *licensed* multilateration AVM systems); *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Procedures for Local Multipoint Distribution Service and for Fixed Satellite Services*, Second Report and Order, Order on Reconsideration, and Fifth Notice of Proposed Rulemaking, 12 FCC Rcd 12545, 12588-89 (1997) ("*28 GHz Second Report and Order*") (dismissal of pending incumbent service applications is in the public interest to promote the development of the new service designated to use the spectrum).

[16] *28 GHz Second Report and Order*, 12 FCC Rcd at 12589.

[17] *Id.* at 12588-89.

spectrum to be designated for sole primary FSS use. Thus, pending FS applications should be dismissed to preserve the ability of FSS licensees to use such spectrum for the deployment and operation of ubiquitous GSO FSS user terminals.

In addition, the Commission has distinguished between constructed licensed facilities and unconstructed licensed facilities in adopting grandfathering provisions.[18] Specifically, the Commission has affirmed that the purpose of adopting grandfathering provisions was "[t]o ensure that [a] new licensing scheme does not impose undue hardship on *existing, operating* [] systems."[19] Unconstructed FS systems in the 18 GHz band do not face undue hardship from the Commission's redesignation of this spectrum; they can modify their licenses to conform to the band plan and construct their systems in a primary FS band segment.

b. The Commission Should Not Permanently Grandfather Existing FS Operations.

In the NPRM, the Commission proposes to grandfather existing terrestrial FS stations in the 18.3-18.55 GHz and 18.8-19.3 GHz bands on a permanent co-primary basis, yet also proposes that these bands be used for the ubiquitous deployment of FSS earth stations. The proposal to permanently grandfather FS links, however, is fundamentally inconsistent with the Commission's finding that the terrestrial FS cannot share spectrum with ubiquitous FSS user terminals. Indeed, this proposal runs counter to the premise of the Commission's NPRM, that "the public interest is best served by separating terrestrial fixed service operations from the

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[18] *See AVM Order* at 4728-29.

[19] *Id.* at 4728 (emphasis added).

operations of non-government ubiquitously deployed FSS earth stations. . ."[20] Accordingly, Lockheed Martin believes that the Commission's grandfathering proposal must include a reasonable sunset provision that will phase out the FS designation in primary FSS spectrum and permit FSS systems to deploy ubiquitous, small-antenna user terminals in sole primary FSS bands. In implementing such a sunset provision, the Commission must carefully balance the requirements of incumbent FS users to transition to new spectrum with the needs of Ka-band FSS licensees to facilitate the introduction of new services and avoid unnecessary capital outlays. Lockheed Martin understands that the Commission will soon issue a decision in connection with its 2 GHz MSS proceeding that will provide insight into the Commission's approach in the 2 GHz band; Lockheed Martin will comment further on these issues as they relate to the Ka-band once it has had an opportunity to review the Commission's decision.

II. BLANKET LICENSING OF FSS EARTH STATIONS

Lockheed Martin supports the Commission's proposal to implement blanket licensing in certain bands for ubiquitous small-antenna FSS earth stations. Specifically, Lockheed Martin urges the Commission to immediately adopt blanket licensing in bands that are currently designated primary solely for FSS, and to expeditiously implement blanket licensing in bands that will become sole primary for FSS, or that are co-primary with other services.

[20] NPRM ¶ 1.

A. General Technical Issues Relating to GSO FSS Blanket Licensing.

1. Issues Addressed By the GSO Ka-Band Blanket Licensing Industry Working Group.

Many of the technical issues relating to GSO FSS blanket licensing have been addressed by the GSO Ka-Band Blanket Licensing Working Group ("BL-WG"), the first report of which has been filed with the Commission in connection with this proceeding.[21] Lockheed Martin strongly supports the compromise uplink off-axis e.i.r.p. spectral density limits agreed to by the large majority of participants in the BL-WG as well as the other technical matters on which the BL-WG was able to reach consensus.

Specifically, Lockheed Martin supports the adoption of an uplink e.i.r.p. spectral density limit of 25.0 dBW/MHz measured at an off-axis angle of 2°.[22] This figure represents a substantial reduction from Lockheed Martin's initial preferred value of 32.6 dBW/MHz, and constitutes the lowest off-axis e.i.r.p. spectral density limit at which Lockheed Martin's Astrolink™ System can operate blanket licensed user terminals in a 2° spacing environment.[23] Commission adoption of a lower value would preclude the deployment of small-antenna user terminals by the Astrolink™ System and many other licensed Ka-band GSO FSS systems,

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[21] *See* Report of the GSO Ka-Band Blanket Licensing Industry Working Group, Conditions for Compatibility with 2° Orbital Spacing (filed Nov. 19, 1998) ("*BL-WG Report*"). Lockheed Martin believes that the impact of transmit earth station antenna pointing errors must be included in the Commission's maximum uplink off-axis e.i.r.p. spectral density level. Thus, this limit must be met for the worst case pointing errors of transmit earth stations. *See id.* at 11.

[22] *See BL-WG Report* at 7.

[23] *See id.* at 8.

making those systems non-viable. Lockheed Martin also supports the downlink p.f.d. spectral density limit of -120 dBW/m²/MHz averaged across a 40 megahertz band, with a higher limit of -118 dBW/m²/MHz applicable on a per megahertz basis.[24]

In addition, Lockheed Martin agrees with the Commission's proposal to individually license earth stations that do not comply with the adopted uplink off-axis e.i.r.p. density and downlink p.f.d. threshold values if these earth stations are coordinated with affected Ka-band satellite systems. As discussed in the *BL-WG Report*, such authorizations should include a caveat that coordination agreements are valid only as to the operators with which they were reached, and that another coordination agreement covering non-conforming earth station operations must be reached if the Commission reassigns the subject orbit location to a new operator.

2. Other Technical Issues.

The Commission requested comment on the potential application in the 28.35-28.6 GHz and 29.5-30.0 GHz bands, in directions other than the GSO arc, of the stringent uplink power density envelope proposed for GSO FSS earth terminals in the GSO plane. Lockheed Martin strongly opposes this approach to GSO/NGSO sharing in primary GSO FSS spectrum because it would place an undue burden on GSO FSS licensees and could significantly increase the cost and complexity of GSO FSS user terminals, thereby increasing the costs to consumers of accessing new GSO FSS technology and services.

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[24] *See id.* at 6.

Moreover, imposition of such onerous requirements on GSO FSS operators would contradict the primary GSO FSS and secondary NGSO FSS designations in the subject bands. As a primary service, GSO FSS systems cannot be required to "protect" secondary users of the band. Conversely, secondary NGSO FSS operators must accept interference from, and must not cause interference into, primary GSO FSS systems. The application of stringent uplink power density requirements to use of primary GSO FSS spectrum by secondary NGSO FSS systems would turn these designations on their heads, and should not be pursued by the Commission.

The Commission also requested comment on whether earth station blanket license applicants should be required to submit a technical description of how they will comply with the requirement that Ka-band FSS earth stations employ uplink adaptive power control or other methods of rain fade compensation. Lockheed Martin agrees that such a demonstration would be useful in the context of a blanket licensing application, and believes that, at a minimum, the following parameters should be addressed in the context of such a demonstration:

(a) Minimum rain attenuation threshold before uplink transmit power can be increased;

(b) When uplink transmit power is increased, it must be on a dB-for-dB basis in relation to the varying levels of further rain attenuation (above the threshold referred to in (a) above); and

(c) The accuracy of the uplink power control to the downlink rain fade must be defined, and related to the minimum rain attenuation threshold referred to in (a) above.

Depending on the above parameters, it may also be necessary to specify the transient parameters of the uplink power control system, so that overshoots or slow response times do not result in any increased interference levels above the clear sky levels. However, Lockheed Martin

believes that blanket license applicants should be permitted to request confidential treatment for this and other proprietary information submitted to the Commission.

As discussed above, Lockheed Martin supports the adoption of uplink and downlink power density requirements necessary to achieve efficient operation in a 2° orbit spacing blanket licensing environment. We note, however, that U.S. government Ka-band satellite systems would not necessarily be expected to comply with these limits, which could lead to coordination problems between commercial and government Ka-band satellites where close orbital spacing and co-frequency operation exists.[25] In addition, potential out-of-band interference must be addressed where close orbit spacing (in some cases collocation) exists, and where the U.S. government satellites are using frequencies in the immediately adjacent frequency bands. Therefore, Lockheed Martin urges the Commission to facilitate, on an expedited basis, coordination discussions between commercial Ka-band licensees and the appropriate U.S. government agencies.

Finally, the Commission notes that Canada and Mexico have allocated the 18.3-18.55 GHz, 18.8-19.3 GHz, 28.35-28.6 GHz, 28.6-29.1 GHz and 29.25-29.5 GHz bands for co-primary use by FSS and terrestrial FS systems. Lockheed Martin believes that blanket licensing can be effectively implemented in these bands, although earth stations which seek to operate close to the U.S. border with Canada or Mexico should be subject to additional criteria to facilitate cross-border coordination. Specifically, Lockheed Martin supports the establishment of a "border zone" (a geographic area within a specified distance from the U.S. border) within which Ka-band

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[25] The Commission's existing Ka-band orbital assignment plan was designed to achieve a minimum 2° orbit spacing between all commercial Ka-band licensees and any U.S. government satellite that operate co-frequency.

FSS earth stations would be subject to a p.f.d. threshold at the border, and in which they may be subject to interference from neighboring FS transmitters, depending on the geometry of the interfering and wanted signal paths in each case. Earth station operators seeking to exceed this p.f.d. threshold, or which require interference protection from neighboring FS networks, should be permitted to coordinate their operations with FS licensees in Canada or Mexico on a case-by-case basis. This may require formal coordination of any such earth stations with the ITU to provide the necessary international protection. Lockheed Martin believes that a study should be conducted to determine the correct distance and p.f.d. value required to define this "border zone."

B. Band Specific Blanket Licensing Issues.

1. Blanket Licensing Should Be Adopted Immediately in the 28.35-28.6 GHz, 29.5-30.0 GHz, and 19.7-20.2 GHz Bands.

In the bands where GSO FSS currently has a sole primary allocation, the 28.35-28.6 GHz and 29.5-30.0 GHz uplink and the 19.7-20.2 GHz downlink bands, the Commission should implement blanket licensing immediately, and should not wait for resolution of the other, more difficult issues under consideration in this rulemaking proceeding. In this connection, Lockheed Martin agrees with the Commission's proposal to adopt a ten-year blanket license term, to be co-terminus with the underlying space station license term.

The FCC proposes to require GSO FSS operators to designate a point of contact for information on the location and frequency use of blanket licensed earth stations to ensure that secondary users in the bands have adequate information to avoid causing harmful interference into GSO FSS blanket licensed earth terminals. In addition, the Commission proposes to require GSO FSS blanket licensees to file annual reports with the Commission to monitor the number of new earth terminals brought into use in each year. Although information regarding the

deployment of new Ka-band earth terminals may be generally useful, Lockheed Martin believes that imposition of requirements to establish and maintain databases regarding the locations and operational characteristics of extremely large numbers -- potentially millions -- of blanket licensed FSS user terminals would be overly burdensome and unnecessary.

As noted above, Lockheed Martin urges the Commission to avoid designating co-primary FSS/FS spectrum, and to phase out by a date certain any secondary FS designation proposed in primary FSS spectrum. If the Commission chooses to permit secondary FS operation in primary FSS spectrum, it should not impose overly burdensome requirements but instead should require secondary FS users to provide a generic, rather than site-specific, demonstration of non-interference. If the Commission chooses to retain co-primary FSS/FS spectrum, however, such recordkeeping and reporting requirements would be needed to facilitate interservice coordination. Elimination of FSS/FS sharing on a co-primary or secondary basis would avoid the need to establish such burdensome recordkeeping and reporting requirements.

The Commission also seeks comment on other specific technical criteria to be adopted for the blanket licensing of GSO FSS earth stations. As noted in its report, the BL-WG continues to work on important technical issues relating to blanket licensing, and will report its additional findings to the Commission in due course. Lockheed Martin has participated in the BL-WG and supports the technical decisions agreed upon by that group.

2. Blanket Licensing in the 18.3-18.55 and 18.55-18.8 GHz Bands Should be Adopted Under the Same Criteria as Other Bands Where GSO FSS has a Sole Primary Designation.

Under the Commission's proposed band plan, the 18.3-18.55 GHz band will be designated for GSO FSS use on a sole primary basis. Therefore, GSO FSS blanket licensing

should be implemented in this band under the same criteria identified above for the other sole GSO FSS primary bands.

Even if the Commission retains co-primary GSO FSS and FS designations in the 18.55-18.8 GHz bands, however, blanket licensing of GSO FSS earth terminals still should be implemented. Under such circumstances, the Commission would grant a blanket license to a GSO FSS operator, and then it would be up to the GSO FSS operator and the FS operators to coordinate prior to the deployment of GSO FSS terminals. Thus, it would be necessary for GSO FSS operators to maintain a database of technical information on all satellite earth stations operated in the band to facilitate the coordination process, which would be made available to the licensed FS operators in the band. Sharing and coordination criteria would be governed by the Commission's existing rules, although it may be necessary to update some of the technical parameters to reflect differences at Ka-band frequencies.[26] Of course, the ubiquitous deployment of GSO FSS earth stations would not be possible under such circumstances.

3. Blanket Licensing Should be Implemented in the 29.25-29.5 GHz Uplink Band Shared with Mobile-Satellite Service Feeder Links.

The Commission should implement blanket licensing of GSO FSS earth stations in the 29.25-29.5 GHz uplink band, which is shared on a co-primary basis between GSO FSS and mobile-satellite service ("MSS") feeder links. The Commission has addressed the issue of GSO FSS and NGSO MSS feeder link sharing of this band in the *28 GHz First Report and Order*.[27] In the course of adopting the 28 GHz band plan, the Commission moderated discussions between

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[26] *See* 47 C.F.R. § 25.203.

[27] *28 GHz First Report and Order*, 11 FCC Rcd at 19034-35.

the GSO FSS applicants and the NGSO MSS applicants to facilitate a sharing arrangement acceptable to both services. This sharing arrangement was adopted and included in the Commission's rules at 47 C.F.R. § 25.258. Specifically, the Commission's rules require: (i) the operators of NGSO MSS feeder links and GSO FSS earth stations in the band to cooperate fully in coordinating their systems; (ii) licensed GSO FSS systems to operate in the vicinity of operational or planned NGSO MSS feeder link earth station complexes with frequency/polarization selections that will minimize unacceptable interference, to the maximum extent possible; (iii) NGSO MSS systems in the band to compensate for nodal regression due to the oblate shape of the Earth, and thus maintain constant successive sub-satellite ground tracks on the surface of the Earth; and (iv) NGSO FSS systems applying to use the band to demonstrate that their systems can share with authorized U.S. GSO FSS systems operating in the band.[28]

The Commission's existing rules, as negotiated by GSO FSS and NGSO MSS applicants, were predicated on the proposition that NGSO MSS earth station facilities would be located in a limited number of geographic locations, thereby enabling the GSO FSS licensees to operate earth stations without constraints in other areas. In fact, TRW, the only NGSO MSS licensee that was authorized to operate NGSO MSS feeder links in the 29.25-29.5 GHz band, planned to operate only two feeder link earth stations in the United States.[29] At the current time, there are no NGSO MSS operators licensed to operate in this band.[30] In order to protect the

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[28] 47 C.F.R. § 25.258.

[29] *See 28 GHz First Report and Order*, 11 FCC Rcd at 19035.

interests of future NGSO MSS systems while also allowing the GSO FSS operators to make efficient use of this spectrum band, the Commission may wish to identify a *limited* number of earth station sites to be used by future NGSO MSS systems with the requisite operational characteristics. GSO FSS operators would then be able to operate and coordinate earth stations with these reserved NGSO MSS feeder link sites, and the GSO FSS terminals could be blanket licensed in this band.

Where specific geographic locations for NGSO MSS operators are identified, GSO FSS terminals could be blanket licensed subject to geographic constraints. To effectuate this sharing of the spectrum, the Commission could restrict deployment of GSO FSS earth stations operating on either polarization within a certain number of kilometers from an NGSO MSS feeder link station. This restricted distance might not be the same in directions relative to the NGSO MSS site because the interference will be dependent on the azimuth pointing direction of the GSO FSS earth station. Earth stations operating on the opposite polarization from the NGSO MSS facility could be deployed anywhere without constraint.

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[30] As the Commission is aware, TRW was licensed to operate an NGSO MSS system in this band, but notified the Commission on January 7, 1998 that its authorization could be canceled. *See Satellite Policy Branch Information; Satellite Applications Accepted for Filing,* Public Notice, Report No. SPB-114, (Jan. 15, 1998). Iridium, LLC is the only other NGSO MSS applicant seeking authority to operate feeder links in the 29.25-29.5 GHz band. *See Satellite Policy Branch Information; Satellite Applications and Letters of Intent Accepted for Filing in the 2 GHz Band*, Public Notice, Report No. SPB-119 (Mar. 19, 1998).

4. Blanket Licensing in the 18.8-19.3 GHz and 28.6-29.1 GHz NGSO FSS Bands Should be Adopted Only After Technical Criteria are Developed with Input from NGSO FSS System Applicants.

The Commission has recognized that sufficient information does not exist to enable it to propose specific blanket licensing criteria for NGSO FSS systems.[31] The technical issues facing NGSO FSS systems differ from those addressed by the GSO FSS licensees in the BL-WG. Also as recognized by the Commission, any blanket licensing criteria developed for NGSO FSS systems "must permit multiple NGSO FSS systems to share the band."[32]

In order to provide the Commission with sufficient information for the creation of NGSO FSS blanket licensing criteria, an industry group similar to the BL-WG should be created for NGSO systems. However, unlike in the GSO FSS context, there is only one licensed NGSO FSS system at the current time. To ensure that the blanket licensing criteria developed for NGSO FSS systems do not preclude the use of the band by NGSO FSS systems other than the current licensee, the NGSO industry group should include NGSO FSS systems with pending applications, such as Lockheed Martin's LM-MEO System. The Commission should adopt NGSO FSS blanket licensing criteria based on the consensus views of this group.

III. BROADCAST-SATELLITE SERVICE ALLOCATION

In response to a petition filed by DIRECTV Enterprises, Inc., the Commission proposes to amend the U.S. Table of Frequency Allocations to include an allocation of the 17.3-17.8 GHz band for the broadcast-satellite service ("BSS") in conformance with the international

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[31] NPRM ¶ 68.

[32] *Id.* ¶ 69.

BSS allocation in this band for Region 2. In conjunction with this allocation of downlink spectrum, the Commission also proposes to allocate uplink spectrum in the 24.75-25.25 GHz band for BSS use. These allocations would not become effective until the international BSS downlink allocation becomes effective on April 1, 2007.

A. The Commission Should Allocate the 17.3-17.8 GHz and 24.75-25.25 GHz Bands Domestically for BSS.

Because there is insufficient capacity available for use in the United States in the Planned BSS bands to support the development and expansion of new BSS businesses, Lockheed Martin supports the proposal to domestically implement a BSS allocation in the Ka-band.[33] Allocating the 17.3-17.8 GHz and 24.75-25.25 GHz bands for BSS and BSS feeder links would provide essential spectrum required not only for traditional video programming, but also for the development of next-generation BSS services to satisfy a variety of information, distance-learning, and broadband multimedia requirements of U.S. consumers. Therefore, the Commission should implement its proposal to domestically implement a BSS allocation in the 17.3-17.8 GHz and 24.75-25.25 GHz bands effective April 1, 2007.

B. BSS Service Rules Should be Adopted in a Later Proceeding.

As the Commission noted, U.S. Government use of the 17.3-17.8 GHz band precludes the BSS allocation in this band from becoming effective until April 1, 2007. Therefore, as the Commission recognizes, there is no need to make the BSS uplink allocation effective prior to this date. Also as recognized by the Commission, in light of the delay in implementation of the allocation, service rule issues regarding BSS use of this spectrum should not be addressed at this time, but should be discussed in a separate proceeding.

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[33] *See Lockheed Martin Statement in Support of DIRECTV Enterprises, Inc.'s Petition for Rulemaking*, RM No. 9118 (filed July 31, 1997).

IV. CONCLUSION

For all the foregoing reasons, Lockheed Martin supports the Commission's proposal to segment the 18 GHz band and requests that the 18.55-18.8 GHz band be designated for GSO FSS use on a sole primary basis to permit full deployment and operation of the licensed Ka-band satellite systems. In addition, Lockheed Martin urges the Commission to adopt GSO FSS blanket licensing procedures in GSO FSS primary bands as expeditiously as possible, and to adopt blanket licensing procedures for NGSO FSS systems only after industry representatives have had an opportunity to develop appropriate licensing criteria. Finally, Lockheed Martin supports the addition of BSS and BSS feeder link allocations in the 17.3-17.8 GHz and 24.75-25.25 GHz bands.

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ENGINEERING CERTIFICATE

I hereby certify that I am the technically qualified person responsible for the preparation of the engineering information contained in the technical portions of the foregoing Comments of Lockheed Martin Corporation, that I am familiar with Part 25 of the Commission's rules, and that the technical information is complete and accurate to the best of my knowledge and belief.

Richard J. Barnett, Ph.D.
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November 19, 1998

CERTIFICATE OF SERVICE

I hereby certify that the foregoing **Comments of Lockheed Martin Corporation** were sent this 19th day of November, 1998, by first-class mail (except where hand delivery is denoted by an asterisk), to the following persons:

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